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Hog Houses

UNITED STATES DEPARTMENT OF AGRICULTURE

CONTENTS

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HOG HOUSES

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Swine production is an important enterprise in the United States. Gross income from hogs during 1954 was about 4 billion dollars. More than 92 million pigs were saved from the 13 million litters farrowed. Properly built structures are an important part of a swine production enterprise. The structures should provide for housing, handling, and feeding the swine in accordance with good production practices.

This bulletin discusses the structural requirements and space needs for swine housing in the United States. It may be desirable to modify the general recommendations given here, to provide for special local conditions or personal preferences of operators.

FUNCTIONAL REQUIREMENTS OF SWINE HOUSING

In planning and constructing housing for swine, several functional requirements should be considered: Protection during adverse weather; desirable temperatures; proper ventilation and insulation; adequate floor space; easy and thorough cleaning; convenience in feeding and handling the swine; safety of the animals and the men in handling them; and economical utilization of structures and equipment.

Protection from adverse weather is important at all times. Protect swine from snow, cold rain, wind, and temperature extremes. Summer shade may be as important as winter warmth. Prolonged exposure to bright sunshine may cause swine to become overheated, even during moderate weather.

Desirable Temperatures

Desirable temperatures within swine houses depend upon the manner in which the buildings are used. Temperatures between 50° and 60° F. are desirable for farrowing houses, with small areas for the pigs warmed to around 80° by means of pig brooders or heat lamps. Sows are most comfortable at temperatures between 50° and 60°, although recent studies indicate the sows will remain in good health and maintain normal weight at temperatures up to 70°. Small pigs are quite comfortable at temperatures around 80°, shiver when standing alone at 70°, and are quite cold at 60°.

If the temperature within a farrowing house drops below 45° F. at farrowing time, use heat lamps to warm the area immediately around the sow. Newborn pigs will chill quickly at room temperatures below 45°. The pigs will not move away from the sow to a warmed area during the first few hours after birth.

The desirable temperatures for feeder pigs depend upon the size of the animals, but above-freezing temperatures are desirable in all cases. Heavy hogs make the cheapest and most rapid gains at a temperature of 60° F. Lighter pigs make their best gains at higher temperatures—pigs weighing around 100 pounds do best at a temperature of about 70°. Figure 1 shows the feed consumption of pigs housed in a controlled temperature room and indicates the effect temperature may have on production.

Ventilation

Controlled ventilation is most important during cold weather. It is desirable to conserve heat produced by animals and yet important to remove the moisture they produce. Excess moisture within a building will make damp quarters for the animals and may hasten the decay of the structure. Ventilating air removes heat as well as moisture, so the quantity of air circulated should be carefully controlled. During warm weather, doors and windows are usually opened and controlled ventilation is no longer warranted.

[1] The authors wish to express their appreciation for selected data and plans developed by North Central Regional Research Project N. C. 23, Requirements and Design of Structures and Related Equipment for Unified Farmstead Operation.

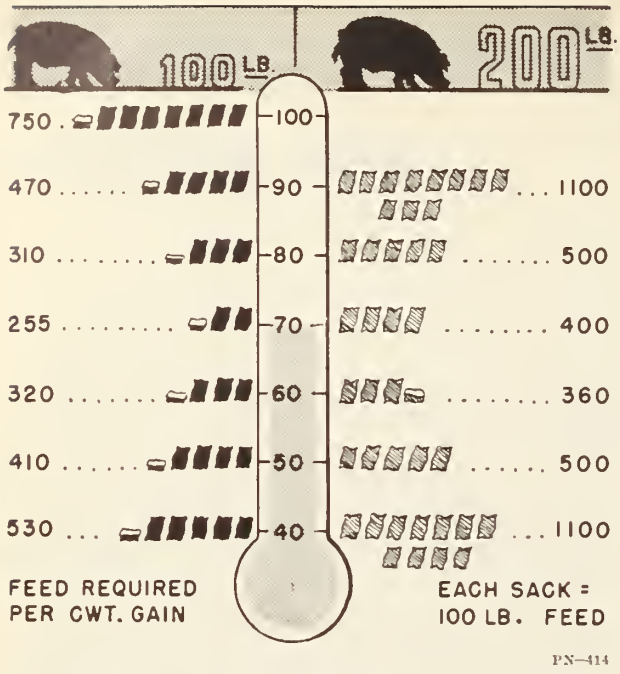

Figure 1.—Effect of temperature on production efficiency of swine.

The ventilation system should be capable of removing from 4 to 6 pounds of moisture daily for each hog from 100 to 300 pounds; it should be able to remove 12 pounds, or more, daily for each sow with litter. The volume of air required to do this will vary with air temperatures, both inside and outside the hog house. Recommended ventilation rates are shown in table 1. These rates are based on the amount of ventilation normally required to remove all excess moisture when the inside air temperature is 50° F. and the outside temperatures are as shown. The basic and most practical ventilation rate will be the one corresponding to the average January temperature of your area (fig. 2).

Occasionally, outside temperatures will be lower than the average January temperatures for which a particular ventilation system is designed. During such periods reduce the ventilation rate so as to maintain a reasonable inside temperature. This will cause an increase in relative humidity, and perhaps some condensation, but such conditions are not too critical for short periods of unusually cold weather. When practical, it is better to supply supplemental heat in the house during cold periods so the ventilation rate need not be reduced.

During periods of mild weather, when outdoor temperatures are above the January average, the ventilation will be somewhat self-adjusting in that inside temperatures will rise and more moisture will be removed by the same amount of ventilating air. However, because the inside temperature does tend to increase during mild-temperature periods, it is often desirable to have additional ventilation capacity during such periods.

TABLE 1.—*Recommended ventilation rates for hog houses when inside air temperature is 50° F.*

Average outdoor air temperature [1] (° F.)	Ventilation rate (Cubic feet per minute per hog)			
	Sow with litter	Other pigs weighing—		
		100 pounds	200 pounds	300 pounds
0	21	6.6	7.7	9.0
5	22	6.8	8.0	9.3
10	23	7.2	8.4	9.8
15	25	7.7	9.0	10.4
20	27	8.4	9.8	11.4
25	30	9.5	11.1	12.9
30	34	10.7	12.5	14.5
35	43	13.3	15.5	18.0

[1] See figure 2 for average January temperatures in the United States.

To aid in selecting exhaust-fan capacities, four types of fan installations are suggested:

1. *Single fan.* Select fan for maximum capacity shown in table 1. Use thermostatically controlled dampers to reduce ventilation rate when inside temperature drops below 40° to 45° F.

2. *Single fan.* Select fan for capacity 25 to 50 percent greater than the maximum indicated in table 1. Use two-speed thermostatically controlled fans to reduce ventilation rate to that of table 1 when inside temperature is below 65° F., and to reduce ventilation rate further when temperature drops to 40°. Use fan at full capacity after cold spell to dry out house.

3. *Two fans.* Select fan "A" for maximum capacity shown in table 1 and fan "B" with 50 percent of this capacity. Use fan "B" only when inside temperature is below 40° to 45° F. Use fan "A" only when inside temperature is between 45° and 65°. Use both fans when inside temperature is above 65° or to dry out house after cold spell.

4. *Three fans.* Select all three fans each with half the maximum required capacity shown in table 1. Use one fan only when inside house temperature is below 40° to 45° F. Use two fans when inside temperature is between 45° and 65°. Use all three fans at temperatures above 65° or to dry out house after cold spell.

Select fans and accessory damper and control equipment that will permit as great a capacity range as practical to allow for changes in the numbers of animals housed and that will permit ventilation control over a wide range of outdoor temperatures.

It is advisable to let cold fresh air in through inlets at the roof level to mix with warm air near the ceiling. Warm air carries more moisture, so it would seem advisable to exhaust the warm "used" and water-laden air from near the ceiling. Therefore, air inlets and outlets are often placed at opposite sides of building to provide for good circulation. During periods of cold weather it is

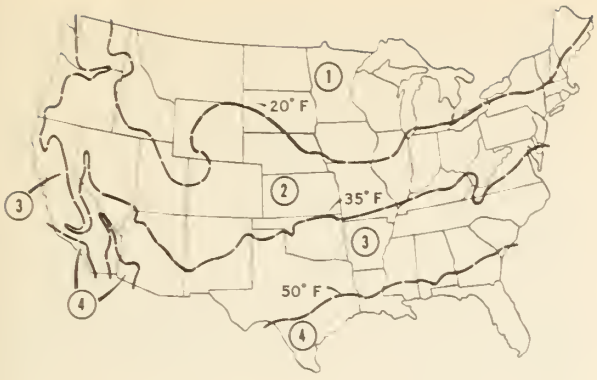

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Figure 2.—Map showing average January temperatures throughout the United States.

better to exhaust air from near the floor to provide for additional conservation of heat. A good system would provide for exhausting air from either floor or ceiling, depending upon the need for conserving heat.

Avoid drafts over the animals. Windows and doors that are used as part of the ventilation system are not reliable for controlling ventilation. A good building that is tight and has few cracks will have little leakage of air to cause uncontrollable ventilation.

Insulation

Insulation reduces the rate at which heat will move through walls, ceiling, and roof. An insulated house is more easily warmed in winter and cooled in summer than an uninsulated house.

TABLE 2.—*Construction and insulation recommended for permanent-type swine housing for January average temperature ranges in the United States*

If average outdoor January temperature ranges [1] from —	Construction and insulation recommended for —		
	Walls	Roof	Ceiling [2]
40° to 50° F.	*Single*, outside of studs covered by corrugated metal over skeleton sheathing, or by ½-inch plywood; or *Masonry*, 8-inch solid concrete walls.	Corrugated metal over skeleton sheathing; or ¼-, ½- or ¾-inch plywood; or asphalt roll roofing or asphalt shingles on solid-wood sheathing.	No ceiling required.
30° to 40° F.	*Single*, outside of studs covered by corrugated metal over solid-wood sheathing; or by ¾-inch plywood only; or by matched wood siding with no sheathing or with 25/32-inch wood or ½-inch insulating sheathing; or *Double*, both sides of studs covered by ½- or ¾-inch plywood; or by matched boards or siding; or *Masonry*, 8-inch concrete block filled with sand-gravel or with lightweight aggregate; or 8-inch hollow tile; or 10-inch cavity wall (two 4-inch tile, 2-inch cavity).	Corrugated metal over solid-wood sheathing; or wood shingles on 1- by 4-inch sheathing, spaced 2 inches apart.	¼-inch plywood or ½-inch insulating board.
20° to 30° F.	*Single*, outside of studs covered by matched wood siding, with 25/32-inch insulating sheathing; or *Double*, both sides of studs covered by matched boards or siding plus ½- or 25/32-inch insulating sheathing on one side.	Similar to those for 30° to 50° F. except with ceiling.	¼-inch plywood with 1-inch blanket insulation; or ½-inch insulating board.
10° to 20° F.	*Double*, both sides of studs covered by matched boards or siding with 1- or 2-inch blanket insulation between; or *Masonry*, 10-inch cavity wall (two 4-inch tile, 2-inch rigid insulation in 2-inch cavity).	do.	¼-inch plywood with 2- or 3-inch blanket insulation; or ½-inch insulating board and 1- or 2-inch blanket insulation.
0° to 10° F.	*Double*, both sides of studs covered by matched boards or siding, with 3-inch blanket or 3⅝-inch loose-fill insulation.[3]	do.	¼-inch plywood with 4- or 5-inch loose-fill insulation; ½-inch insulating board with 3-inch blanket, or 4- or 5-inch loose-fill insulation.[3]

[1] For colder part of range, use heavier construction and heavier insulation.
[2] Ceiling may be either on rafters or on joists below.
[3] A vapor barrier should be placed between loose-fill insulation and the inside of the house.

It helps in conserving animal heat during cold weather and, with more heat available, more air can be exchanged and the building will be drier and more comfortable for the animals. Insulated walls and ceilings will be warmer so that moisture in the air inside the building will not condense on them so readily.

The construction and insulation recommended in table 2 will normally provide adequate protection for hogs in areas with the average outside temperatures as shown. Average January temperatures over the United States are shown in figure 2. If a hog house is to be used primarily for farrowing in February or March, the insulation requirements could be reduced to match those recommended for average temperatures 10° to 15° F. higher than the January average of a particular area.

The recommendations of table 2 allow for more insulation in the roof than in the walls. If any condensation does occur, it is better that the moisture be on the walls and windows where it will not drop on animals. Also, since warm air tends to move upward, extra insulation in the roof or ceiling is needed to prevent an excessive loss of heat.

If used, place insulation between frame members where it will be protected by the inner wall lining. If a hog house has a ceiling, the insulation recommended for under the roof may be placed in the ceiling. Add a vapor barrier, usually a glossy, asphalt-treated paper, between the insulation and the inside of the house. Such a vapor barrier insures that vapor from the house will not enter the insulation and condense there to make the insulation damp and ineffective. Blanket-type insulations usually come with the needed vapor barrier on one side.

Space Requirements

The floor space necessary for housing swine is shown in table 3. These requirements are for shelter housing of 10 or more animals per pen when the swine have access to other space outside of the house. Increase space allowances per animal if the swine are confined within the house or if there are fewer than 10 animals per pen. The greatest space per animal necessary will be required when one animal is confined in each pen, in which case use recommendations for farrowing pen. Add service alleys and storage space to the floor space actually occupied by the swine.

TABLE 3.—*Suggested shelter space allowances for hogs in groups of 10 or more*

Animal	Space per animal [1]
	Square feet
SOW:	
Before farrowing	20 to 40
During and after farrowing, in pens	48 to 80
During and after farrowing, with stall	32 to 50
PIG:	
100-pound size	5 to 9
200-pound size	8 to 15
300-pound size	11 to 22

[1] Individually penned animals require more space. Larger space should be allowed in warm weather.

Storage space per ton of certain feeds and bedding is given in table 4. A sow may require a little over a ton of feed each year, or a space allowance of about 60 cubic feet for a year's supply of feed. It will require about ½ ton of feed to raise a pig from birth to market. Storage for this much feed would require about 25 cubic feet. Bedding requirements will be from ¼ to ½ ton per pig. Feeder pigs will use from 400 to 500 pounds of feed for each 100-pound gain, requiring a storage space of 10 to 13 cubic feet per 100-pound gain.

TABLE 4.—*Approximate feed and bedding storage space required per ton of material*

Material	Storage space
	Cubic feet per ton
Shelled corn	45
Ear corn	72
Oats	70 to 80
Small grains	40 to 55
Sacked feed	44 to 50
Straw, loose	500 to 550
Straw, baled	250 to 300
Shavings	100

It is usually necessary to provide space for mixing and handling feed in addition to actual storage space for feed and bedding. Where possible it is desirable to locate this storage and mixing area within the farrowing house. One of the end pens may often be utilized for mixing feed. Where individual houses are used for farrowing, centralize the storage space to reduce travel and labor. Particular care should be taken to ratproof feed rooms and bins.

The width of the alleyway depends on the management program. An alley 3 feet wide may be used, but a width of 4 feet is generally preferred. This is sufficient for moving sows and pigs in or out of the house and keeps down the floor area per animal. An alley of 8 or 10 feet allows room for a truck or manure spreader. Also, such an alley can be used for emergency pens, for additional feeding floor space, or for exercising sows, but a wide alley is additional space to be heated during cold weather.

Provide feeding-floor space according to the space requirements shown in table 5. These recommendations are for swine fed to 250 pounds weight or less. Increase space allowances for

larger hogs approximately in proportion to the weight of the animals.

TABLE 5.—*Feeding floor space requirements for swine*

Method of handling the swine	Method of feeding	Recommended minimum floor area per animal [1]
Swine have access to shelter space in addition to feeding floor.	Self-feeder	8 to 10 square feet in cool weather; 10 to 12 square feet in warm weather.
Swine are confined to the feeding floor area.	do	12 square feet.
Any method of handling swine when feed is scattered on floor.	Hand feeding.	15 square feet.

[1] For swine fed to 250 pounds or less.

Feeding and Watering

Built-in concrete feed troughs are generally not so satisfactory as portable metal troughs. For hand feeding in troughs or for hand watering, use a minimum trough length of 10 inches for each hog under 100 pounds liveweight. Add an extra 4 inches of trough per hog for each increase of 100 pounds.

Where self-feeders are used, allow about 4 inches of feeder space per hog. Since most self-feeders are divided into sections about 12 inches in width, this space allowance provides for about 3 hogs per self-feeder hole.

The weight of the water a pig would normally consume from birth until marketed is about 1 ton. This emphasizes the importance of a good water supply and distribution system in reducing the labor of watering pigs.

Provide a plentiful supply of clean drinking water at all times for the hogs. The system should be able to furnish drinking water at the rates shown in table 6, with allowance for additional water for sanitation and fire protection. A pressure water system with pipes extending to the swine housing and feed lots will greatly reduce the labor required to care for swine. Such a system will eliminate the need for carrying drinking water to swine and will supply water under pressure for cleaning houses and feeding floors. Bury pipelines of permanently installed water systems below frostline. Frostproof hydrants and warmed drinking troughs will largely eliminate freezing problems. Temporary water lines to summer range may be of lightweight portable pipe or flexible plastic tubing. Bury the line a few inches below the ground surface to protect it from mechanical damage and to keep the water cool on hot, sunny days.

TABLE 6.—*Drinking water requirements for hogs*

Hog condition and size	Water required
	Gallons per day
Sow, gestating	4½
Sow, plus litter	6
Pig:	
25-pound	½
60-pound	1½
100-pound	1¾
200-pound	2½
300-pound	3½

Provide about the same watering trough space, where hogs are hand watered, as for the feeder trough space indicated in the section above. For float-controlled troughs, a 12-inch length will provide for 20 to 25 100-pound pigs or 10 sows. Automatic waterers are very desirable, but should be protected from freezing. One automatic watering cup is normally sufficient for about 20 pigs. Automatic waterers with 2 openings would be considered as having 2 cups.

STRUCTURES FOR HOUSING SWINE

Personal preferences of the operator and the management practices to be followed should determine type of swine housing for each farm. Existing structures and facilities will also be an important consideration in many cases when new housing is being planned.

Types of Housing

There are two general types of swine housing: (1) Permanently located houses (also known as community, central, or permanent houses); and (2) movable houses, most commonly with one pen (also known as portable, individual, or colony houses).

Permanently located houses are most commonly used under four conditions: (1) Where the breeding and sale of foundation stock is an important part of the farm program; (2) where there are well-established herds, with no great variation in herd size from year to year; (3) where centralized housing is desirable to simplify winter management problems in colder areas; and (4) where permanent construction is preferred.

Permanent housing offers several advantages. Operations may be concentrated in a central location, simplifying supervision of the herd. Feed and water storage and handling, service equipment, and operating procedures can be planned for most efficient management. Attend-

ants can work in one building, or in closely located buildings, with a minimum of time and labor required. One heating unit and one ventilation system will serve several pens or an entire house. Electrical service can be permanently installed and connected. Permanently located swine houses can generally be more durably constructed, with lower repair and maintenance costs, than for movable houses.

Movable houses for swine are most often used: (1) To protect against infection where large herds are raised; (2) to supplement permanently located housing; and (3) to provide housing for the one or two litters grown on many farms.

The principal advantages of movable houses are: (1) Low cost per individual house, with resultant low initial housing investment required of the beginner or small operator; (2) housing can be quickly and easily moved to clean ground; (3) the same housing can be used to provide shelter on pasture, in fields, and in feed yards; (4) isolation of individual hogs or litters is readily possible; and (5) tenants may own the houses and move them from farm to farm as necessary.

Combinations of permanent and movable housing are frequently used, to obtain the principal advantages of each type. When both permanent and movable housing are maintained on the same farm, investment in housing may be quite high. However, combinations of permanent and movable housing can be obtained at reasonable cost by using movable houses specially planned for

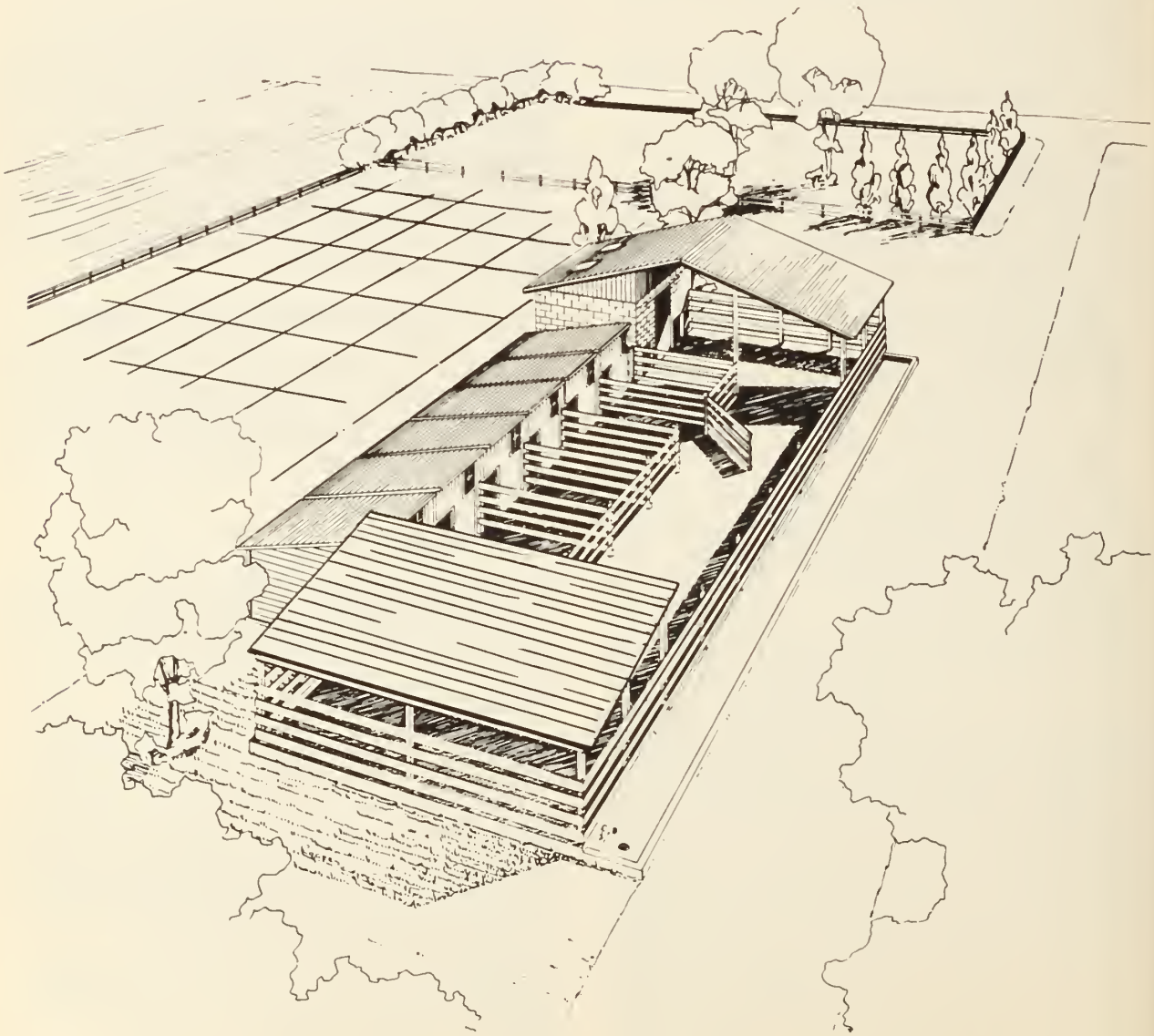

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Figure 3.—Swine production layout, with six movable individual houses set together.

assembly of several individual units into one large unit.

One method of obtaining combination housing for swine is shown in figure 3. Six movable houses are used with a permanent feeding floor, wallow, and feed storage to approximate a permanent house. Another type of combination housing is shown in figure 4. Two movable 2-pen units can be set together, with projecting roofs of the individual units providing a central alley in the combined unit.

Planning Permanent Housing

Build the permanent swine house on a well-drained site, with a moderate, uniform slope away from the structure. Convenience to feed and water supplies and to other buildings where farm chores are done will reduce time and labor of caring for swine. Ready access to pastures and fields simplifies management. Locate the swine house and feed lot so that winds do not carry odors to the farm residence. Use windbreaks to reduce the effects of drifting snow in winter and to provide shade in the summer.

Placement of a swine house on the selected site will depend upon the design of the house. Houses with one row of stalls are most commonly placed with the long dimension east and west, so that each pen may be provided with a south exposure window.

Houses with two rows of pens are generally placed with the central alley running north and south. This usually provides for good circulation of cooling summer breezes to all of the pens. High sidewall or roof windows are not necessary, since windows in the east wall will admit morning sunshine to the east row of pens. Likewise, windows in the west wall let afternoon sunshine into the west row of pens.

Build the size and kind of structure to fit the number of hogs to be handled and the system of management to be followed. If a house is to be

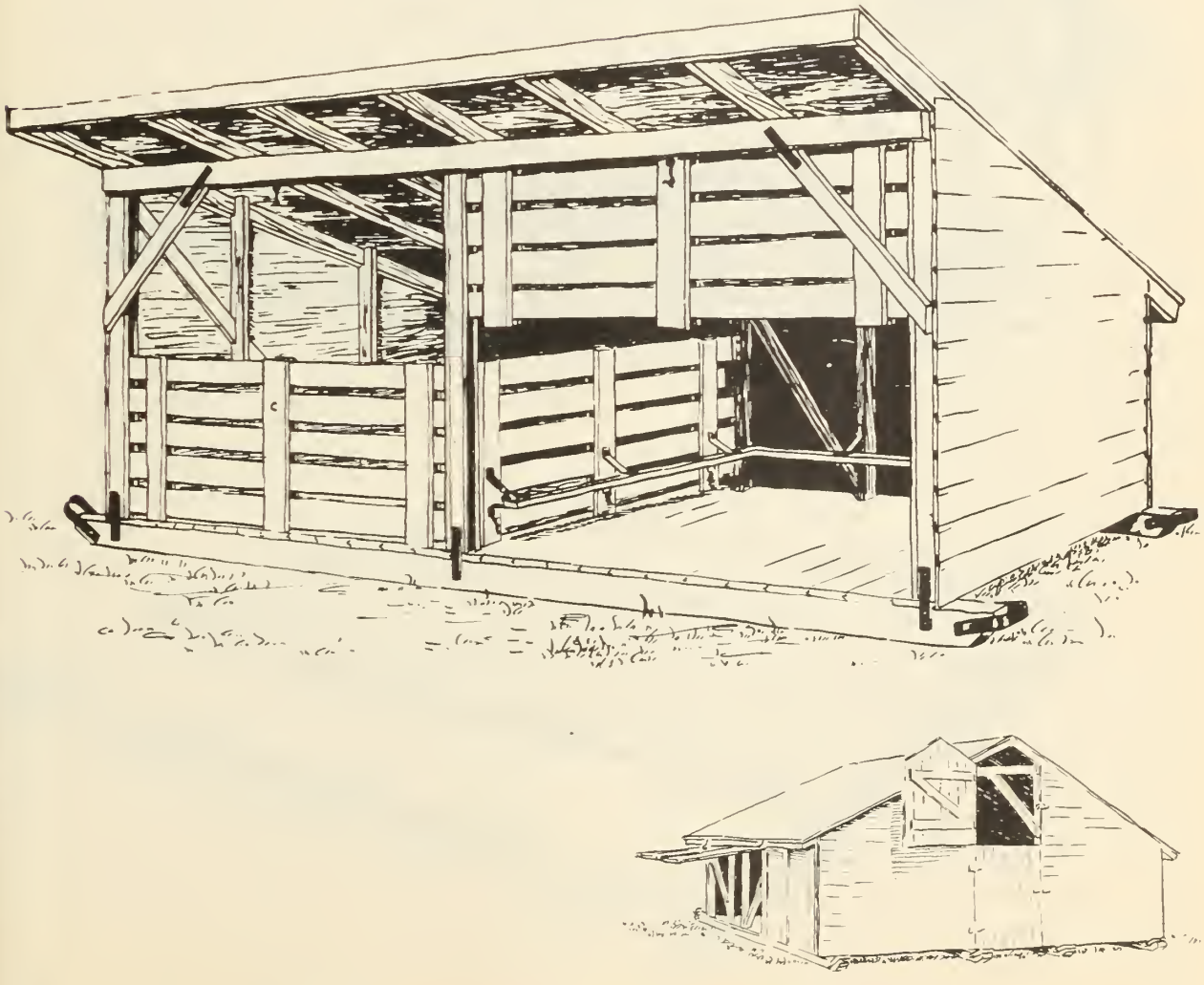

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Figure 4.—Combination house, with two 2-pen units set together.

used primarily for farrowing, allow one-third to one-fifth as many farrowing pens as the number of sows to be farrowed each season. Each pen can be cleaned and used two or five times, depending upon the "time spread" in breeding the sows.

If the confinement system of handling swine is to be used, pens may be used for both farrowing and feeding purposes. About one-half as many pens as the number of sows to be farrowed should be adequate, particularly if partitions can be removed to provide large pens after the farrowing period. Provide floor-space for housing of swine according to the data given in table 3, page 4.

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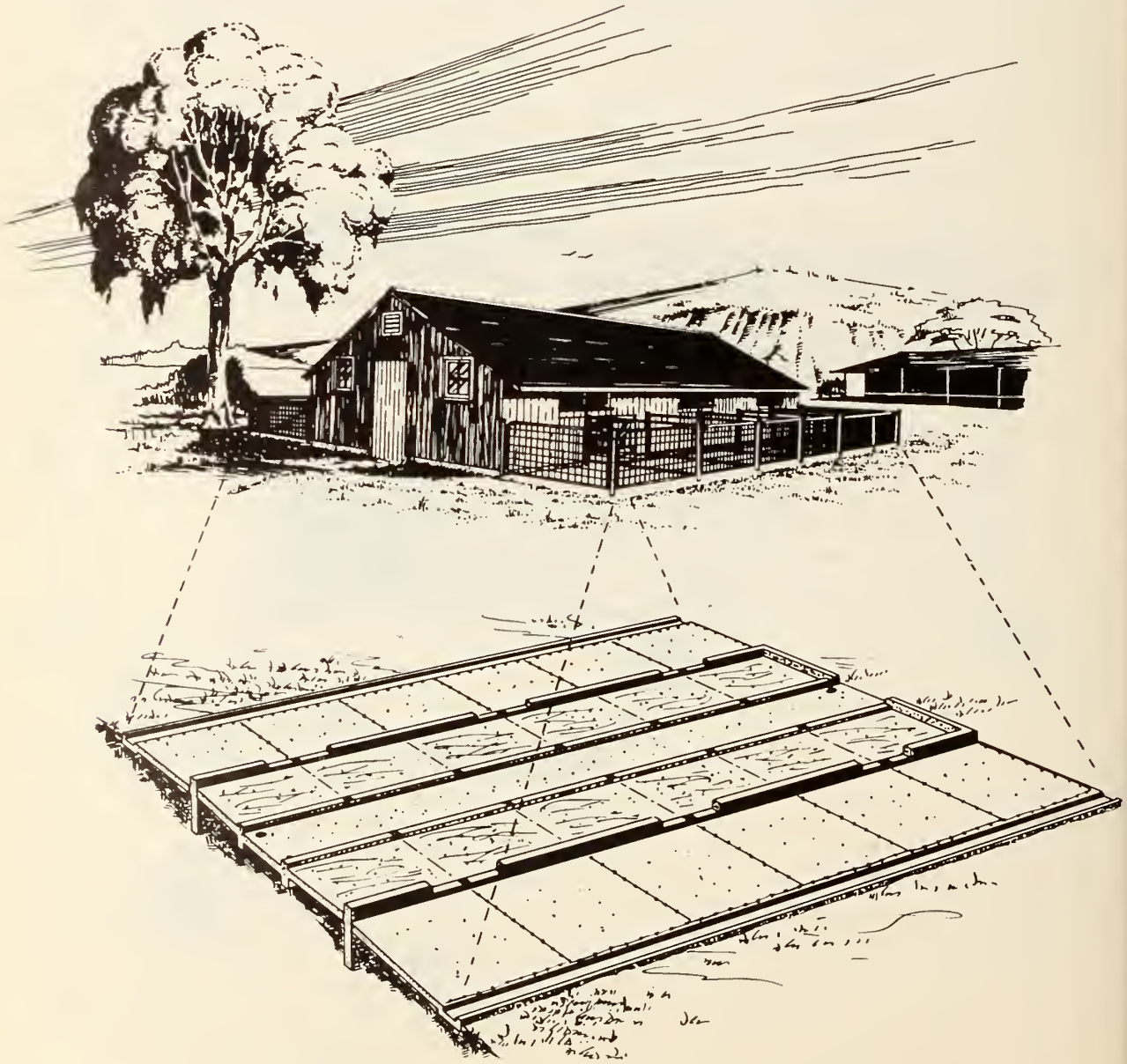
Figure 5.—One-row farrowing house.

Permanent houses may have either one row of pens (fig. 5) or two (fig. 6). A house with one row of pens can be placed at one side of the swine



PN–420

Figure 6.—Two-row farrowing house.

lot with the house outside of the fence to simplify service access to the building. With two rows of pens floor space within the house can be more economically used, since one service alley will serve for the two rows of pens.

Recommended minimum window area is 1 square foot of glass per 30 square feet of floor. In areas of moderate temperatures, twice this amount of window area can be used. Space windows so that they allow some sunlight into each pen during some part of the day. Skylights are not generally recommended. Treat wood sash to resist moisture and rot; coat metal sash with a rust inhibitor.

Artificial lighting is recommended for feeding and during farrowing. A 60-watt lamp is considered ample for 2 farrowing pens or 3 feeding pens. More light may be necessary to provide satisfactory visibility, depending upon the type of pen partition, whether slatted or solid, and on the color and reflective properties of inside wall and ceiling surfaces.

Electric wiring in swine houses must be adequate for the necessary lighting and all anticipated power usage. Use a wall switch outside the pens to control the lights. Provide one duplex convenient outlet for each two pens if pig brooders or heat lamps are to be used. Install special outlets for equipment such as feed grinders or mixers. All electric wiring and fixtures must be moistureproof, corrosion resistant, and grounded for safety. Sufficient circuits must be provided to prevent overloading. The maximum load for a 20-ampere circuit is 1,750 watts.

The height of outside walls without windows can be a minimum of 3½ feet in cold areas to minimize the space volume of the house and conserve heat. Walls with windows should be at least 6 feet high so the bottom of the windows can be the minimum height of 3 feet above the floor. Wall heights may be 8 to 8½ feet in warm areas.

Ceilings are advisable in cold areas. A height of 7 feet at the work alley is sufficient where there are no obstacles below the ceiling.

Build pen partitions at least 36 inches high, except those for boars, which need partitions 48 inches high. Partitions may be solid or slatted. Solid partitions reduce drafts and decrease disturbances among sows. They are desirable in cold regions. In warm areas slotted partitions are often preferred, because they allow a better circulation of air. If partitions are removable, the usefulness of the house will be increased and it will be easier to clean.

Provide guard rails on the sides of the farrowing pen. Extend them 8 to 12 inches out from the sides of the pen with a clearance of 8 to 10 inches between the rail and floor. Where much bedding is used this clearance should be greater. Construct guard rails of 2- by 6-inch, or preferably 2- by 8-inch lumber, and firmly support and fasten the rails to the sides of the pen.

Build pen doors on outside walls as small and snug fitting as possible to reduce drafts and heat losses. A 24-inch width is ample for most hogs. Sows weighing more than 400 pounds may need a 28-inch width. A height of 36 inches may be necessary for large animals, although a height of 34 inches will generally be sufficient for most hogs. The bottom of the door opening should be enough higher than the outside ground to prevent entrance of drainage water, but if higher than 4 inches a ramp or step should be provided to prevent injury to sows and pigs. Vertical sliding doors are generally preferable to hinged doors and may be fitted with a rope and pulleys so as to be opened and closed from the alley. Self-closing doors, which can be opened by the pigs, are used in some areas.

Floors

Swine houses should have floors, for warmth and dryness and to facilitate cleaning. Cracks in floors will complicate cleaning and make disinfection difficult. Construct floors flat and even, but do not finish them so smoothly that they become slippery when wet.

Of the flooring materials, wood probably makes the most comfortable bed, because it has a relatively high thermal insulation value and it does not "draw" heat from the pig's body. However, wood is difficult to disinfect and is subject to damage by the pigs.

Concrete provides a practical floor because it is economical, durable, and easily cleaned; but without proper precaution in building the floor, concrete is certainly far from ideal. Ordinary concrete conducts heat well, so that it assumes the temperature of the ground under it and conducts heat from the pigs as they lay on it; also, it absorbs heat from the pigs by radiation. This heat absorption is a cooling and beneficial factor in summer, but it also is an important loss in winter.

To make concrete slab floors warm and dry, insulate them, including edge insulation and a vapor barrier, and lay floor on well-drained sites. Where there is no natural drainage, raise the floors, by using a fill of gravel or crushed rock. Build edge insulation (fig. 7) of 2 inches of rigid waterproof material and extend it 24 inches under the floor as a border. Provide a vapor barrier to prevent any rise of moisture from the ground into the floor slab. Material used as a vapor barrier should have sufficient strength to resist puncturing when concrete is poured over it. Such material might be duplex paper with an asphalted center, sheets of plastic film, or rigid asphalt board. Some examples of insulated concrete floors are shown in figure 8.

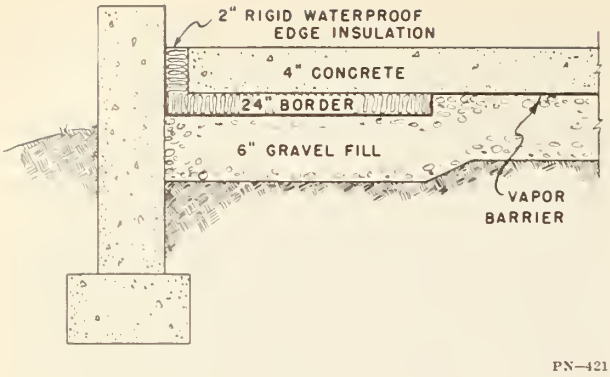


Figure 7.—Method of insulating the edge of a concrete hog house floor.

Concrete feeding floors facilitate good sanitation practices and aid in disease control. Generally, pour concrete floors 4 inches thick, but if they are to carry heavy truck or wagon traffic pour the concrete 6 inches thick. No fill below the concrete is necessary on well-drained ground. Use a subfloor fill of about 6 inches of well-tamped gravel or thoroughly burned cinders on poorly drained ground to raise the floor above the surrounding ground level. Place a curtain wall around the edges of the floor, extending about 18 inches into the ground to prevent undermining of the floor. Finish the floors evenly but not so smoothly that they become slippery when wet.

Floors of inside pens should slope at the rate of one-fourth inch per foot toward a gutter in the service alley. Floors of outside pens should be 2 to 3 inches lower than floors inside the house,

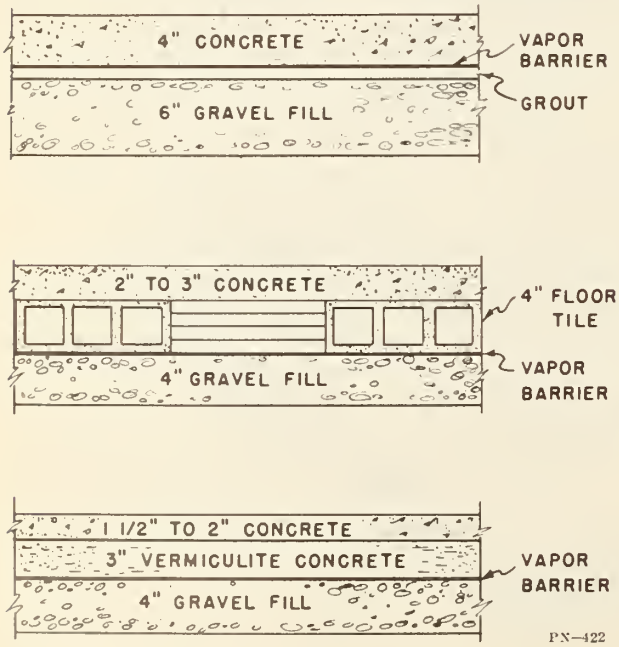


Figure 8.—Examples of insulated concrete floors suitable for hog houses.

and should slope away from the house at a rate of one-fourth inch per foot. For easy cleaning of floors no curbs should be across doorways or at partition lines.

Gutters inside swine houses are usually located in the service alley. Gutters for outside feeding floors are most commonly placed at the outer edge of the floors, away from the house. These gutters should have flat bottoms at least 15 inches wide to facilitate cleaning. Gutters should slope at the rate of one-fourth inch per foot toward disposal drains spaced not more than 40 feet apart.

Disposal drains should carry waste water away from the house and discharge it outside the swine lots, not in streams to which swine will have access. An underground drainage system is preferable, although surface drainage may give satisfactory results for small units. When an underground drainage system is used, a settling basin should be placed in the drainage line outside the building. The settling basin should have a removable cover to permit cleaning when necessary.

Planning Movable Houses

Movable swine houses may be of either single- or multiple-pen construction. Single-pen houses are easier to move and are more readily ventilated without drafts but usually cost more per pen than multiple-unit houses.

Movable houses are most commonly built on well-braced floors laid over skids, or runners, to facilitate moving. Houses without floors are cheaper to construct, but they are less well-braced and should be loaded on sleds, trucks, or trailers for moving.

The floor size of movable swine houses should be based on the space requirements shown on page 4. Single-pen houses may vary in size from 6 feet by 8 feet or 7 feet by 7 feet for small sows and up to 8 feet by 10 feet for large sows in warm areas. Houses with sloping side-walls (particularly A-type houses) will need to be about 1 foot wider than houses with straight side-walls, to provide room for sows to turn around without putting undue pressure on the walls.

Several types of movable swine houses have been used. The A-type house is probably the most simply constructed, but this type does have two important disadvantages: (1) The sloping sides limit the floor space available to hogs; and (2) doors of an A-type house extend to floor level and special precautions must be taken to prevent animals from escaping when doors are opened to tend the swine or to sun the house.

Modifications of the A-type house have been designed to eliminate the disadvantages of regular A-type construction. Two such modifications are shown in figures 9 and 10. The modifications tend to complicate construction and increase cost of the houses, but these changes make the entire floor space usable. Also, part or all of the roof

section may be opened for safer tending and observation of the animals and for sunning the pen.

Houses with straight side-walls have fewer diagonal framing members than modified A-type houses. The straight side-walls simplify construction but may increase the cost of the house.

Three roof types may be used on houses with straight side-walls—center gable, off-center gable, and shed. The gable-type roof permits a lower house requiring somewhat less material than the shed-type roof, but a gable roof is more complicated to frame. The center gable roof is simpler to construct than the offcenter gable roof. On the other hand, doors in the short slope of an off-center gable roof will be smaller and more easily handled than doors in a roof with center gable.

Shed-roof construction of houses with straight side-walls provides one high wall, so that doors above floor level can be placed in the side-wall instead of in the roof (fig. 11).

Hinged side-walls are sometimes used on houses with straight side-walls. Such a house is shown in figure 12. This construction provides for increased ventilation and shade in summer, but the house is more difficult to make tight and draft-free in winter. Also, the cost is generally increased and the house is less well braced, and so it usually is shorter lived than a house with solid walls.

Multiple-pen movable houses for swine are often built in the same way as single-pen houses, except the length of the house is increased to provide the necessary extra floor space. For 4 or more pens in a movable house, both length and width of the house may be increased to provide for 2 rows of pens. The movable house shown in figure 13 has partitions through the house both ways to provide a total of 4 pens.

Materials used in movable swine houses must be strong and durable, yet should be light in weight to facilitate moving the houses. Dressed lumber has been the material most commonly used in the past. Plywood sheets provide excellent bracing and reduce the weight of material needed for a good house. Use only exterior-type plywood, with at least ½-inch thickness for floors and ⅜-inch thickness for walls. If fiber boards are used, protect them from damage by the hogs. You may use sheet metal for roofs, but insulate it to reduce condensation under the roof during cold weather.

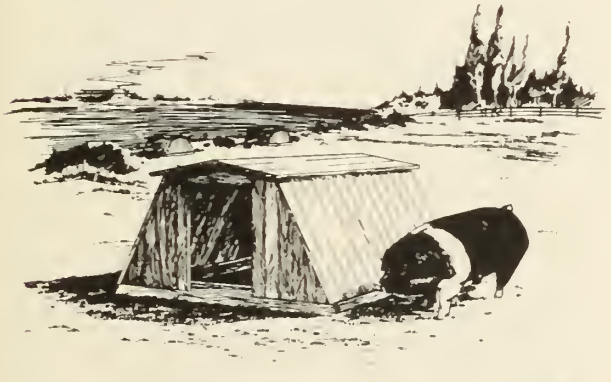


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Figure 9.—Modified A-type house, with removable floor panel.

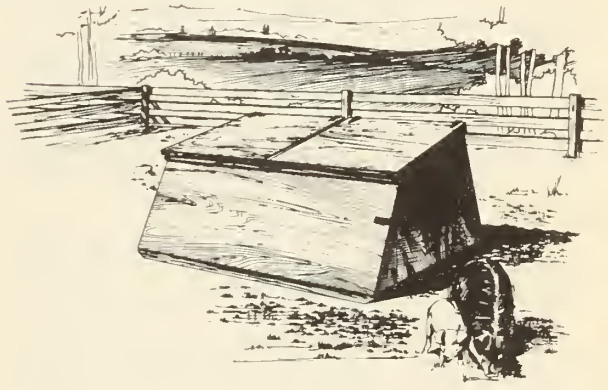

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Figure 10.—Modified A-type house on skids, with built-in floor and plywood construction.

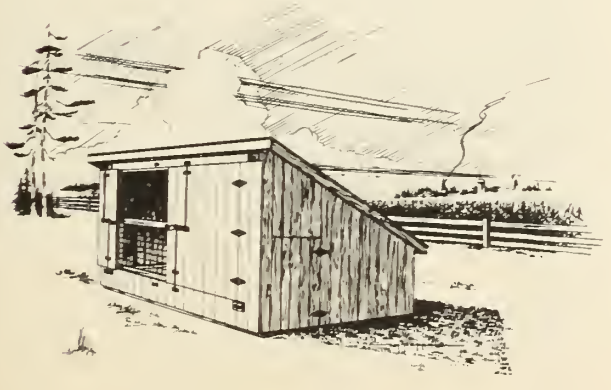

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Figure 11.—Movable house with doors in high side-wall.

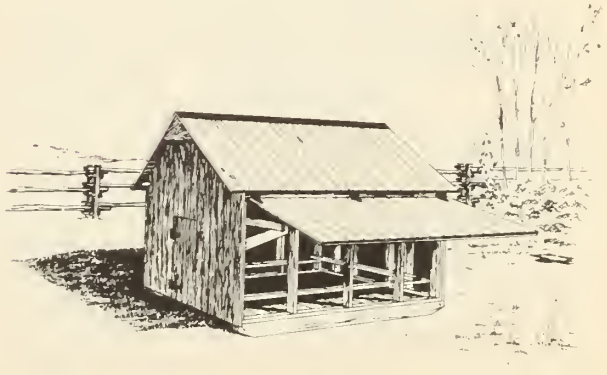

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Figure 12.—Movable house with hinged side-wall.

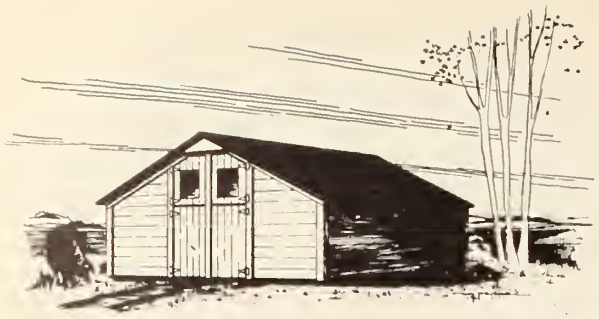

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Figure 13.—A 4-pen movable house.

Ventilation is just as important in movable swine houses as in permanent housing. Ventilation of movable houses is most commonly provided by vent openings in opposite ends of the building near the roof. Such vents should provide at least 20 square inches of opening per pen. Larger openings may be preferred, with hinged covers or dampers to regulate air flow through the house.

Insulation requirements for movable swine houses with straight side-walls can be determined from the general statement of insulation requirements in permanent housing, as given in table 2, page 3. However, movable swine houses usually are not insulated when constructed, because of the resultant increase in weight. Temporary insulation may be provided by grouping individual houses and covering them with straw or by banking dirt around the outside walls.

Movable houses with floors on skids should be banked with dirt during cold weather to prevent circulation of air below the floor.

The useful life to be expected of movable swine houses is quite variable, depending upon quality of material and construction, intensity of use, frequency of moving, care in moving, and maintenance care. A minimum life of 10 years may generally be expected, and with reasonable care a useful life of 20 years or more may be obtained.

SUPPLEMENTARY STRUCTURES AND EQUIPMENT

Farrowing Stalls

The use of farrowing stalls will increase the effective size of a farrowing house (fig. 14). With farrowing stalls two sows may be put into one pen about one and one-half times the size of the usual farrowing pen. Thus, six sows farrowed in farrowing stalls require about the same space as four sows farrowed in conventional pens. Pig losses are reduced during farrowing if farrowing stalls are used.

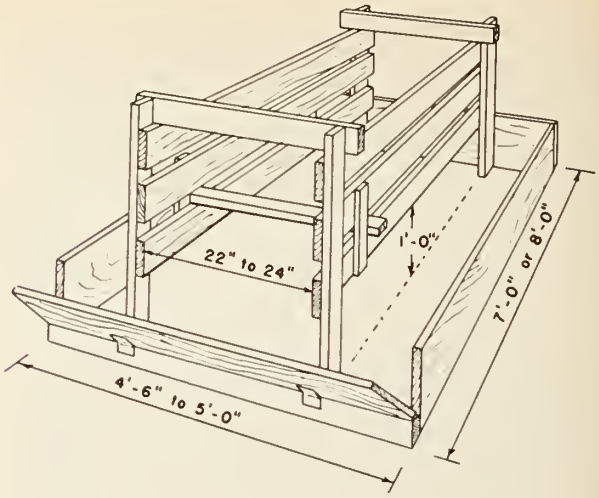

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Figure 14.—Essential dimensions for a farrowing stall.

The farrowing stall shown in figure 14 gives the essential dimensions that must be considered, regardless of type. Average-sized sows need 6 feet clear space from the front of the stall to the tail crosspiece. Bacon-type sows may need somewhat longer stalls. Construct the stall with the bottom boards 8 inches above the floor for gilts and 12 inches above for large sows. Allow at least 12 inches clear space each side of the stall for the pigs. Place boards enclosing the pig area, or separating two units, at least 12 inches high. Provide heat lamps on each side of the stall above the area for the baby pigs. If 100- or 150-watt incandescent lamps are used, place them 10 to 12 inches above the pigs, in switchless porcelain sockets and protected by reflectors and wire guards. Where infrared lamps (250-watt) are used, install them at least 30 inches above the floor; 1 lamp will supply heat for 2 adjacent areas. Protect heat lamps by metal guards. Figure 15 shows four examples of farrowing stall arrangements.

Sows are commonly put into the farrowing stalls a day or two before they are expected to farrow and are kept in the stalls 2 or 3 days after farrowing. While in the stall the sow can be safely tended as necessary during and after farrowing. The sow is less likely to crush the pigs in farrowing stalls, since the pigs will generally go to the heated area outside the stall except when nursing.

Brooders

Pig brooders will aid in reducing baby pig losses. Because they provide additional heat, they attract the baby pigs and keep them out of the way of the sow. When the sow is not confined to

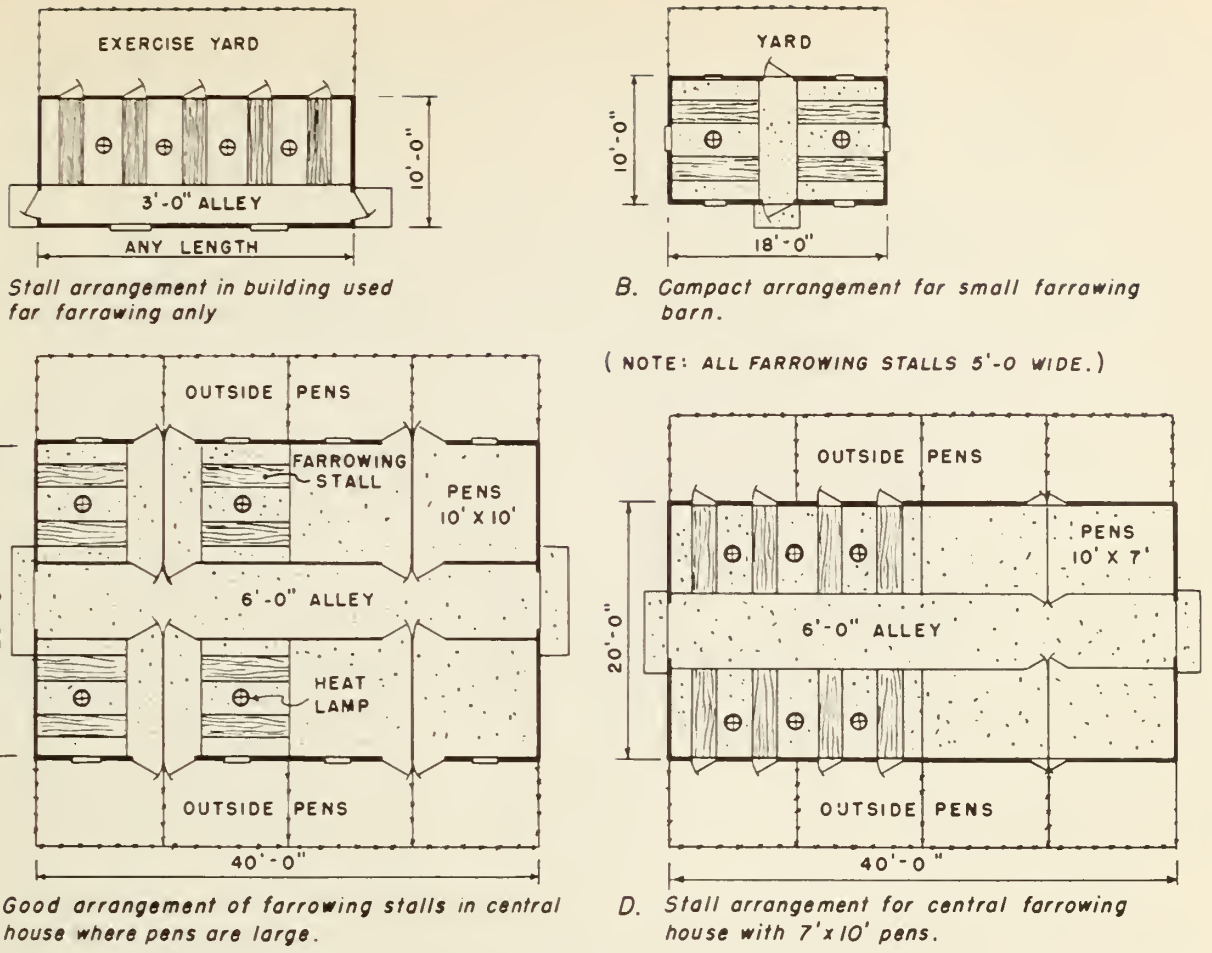

Figure 15.—Examples of farrowing stall arrangements.

a farrowing stall, the heat source must be confined to an area accessible to the pigs only. Figure 16 shows a hover-type corner brooder. The height of such a brooder should be 10 to 12 inches, and the wall edges should be 36 to 42 inches in length. It is necessary to have a guard along the entrance side of the brooder to keep the sow from getting on top. With the hover-type brooder, use only incandescent bulbs. A 100-watt bulb will usually be adequate, and a 150-watt bulb should be the maximum size used in coldest weather. Protect the bulbs by a ¼- or ½-inch mesh hardware cloth. The brooder shown in figure 17 can be placed in any corner, but wherever possible it is best to have it next to the alleyway. This position keeps the pigs away from cold outside walls and locates them where they can be watched and cared for conveniently from the alleyway. If a sliding panel is placed on the open side of the brooder it can be closed to confine the pigs in the brooder area. The brooder area can be made easily accessible if the corner is hinged as shown in figure 18.

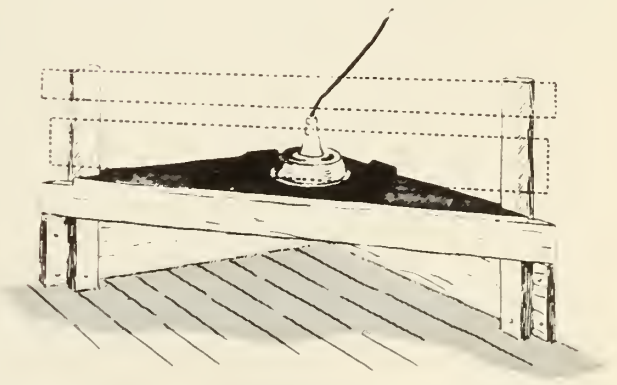

Figure 16.—Hover-type corner brooder. Only incandescent lamps should be used: 60 watts during mild weather and 100 watts during severe weather; never use more than 150 watts.

Figure 18 shows a pen-type brooder that is easily constructed because it has no cover. This is simply a corner area protected from the sow. With this type, infrared lamps are used. Place a 250-watt infrared lamp at least 30 inches high. Install convenient outlets near the brooders so that all wiring and cords will be out of reach of sows and pigs. Do not overload the wiring. The maximum load for a 20-ampere circuit is 1,750 watts (seven 250-watt infrared heat lamps).

SOURCES OF PLANS

Blueprints of plans suitable for a particular locality may be obtained through your State extension service. County agents or farm advisers usually have catalogs illustrating plans available and can aid in selecting and obtaining plans. Plans are also available from lumber and hardware dealers and other commercial organizations.

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Figure 17.—Corner brooder conveniently located next to alleyway. Hinged cover facilitates handling young pigs.

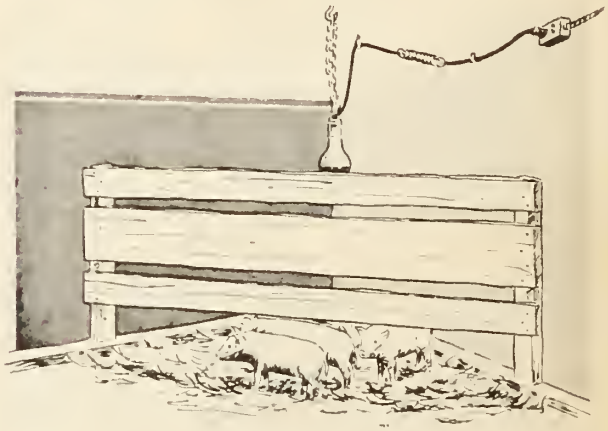

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Figure 18.—Pen-, or creep-type, corner brooder, suitable where infrared lamps are used as heat source.

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